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SEALING, TRIMMING OR GUIDING STRIPSField of the Invention

The invention relates to sealing, trimming or guiding strips.

Strips embodying the invention, to be described in more detail below by way of example only, are for use in sealing, trimming and guiding window glass in motor vehicle body construction.

Brief Summary of the Invention

According to the invention, there is provided a sealing, trimming or guiding strip for a window frame, comprising a length of extruded material extending along and forming part of the strip, a portion of the extruded material along part only of the length thereof having been removed and replaced with moulded material which is moulded onto and thereby connected to the extruded material.

According to the invention, there is further provided a method of forming a sealing, trimming or guiding strip for a window frame, comprising extruding a length of material to form part of the strip, removing a portion of the extruded material along part only of the length thereof, and replacing the said portion with moulded material which is moulded onto and thereby connected to the extruded material.

Brief Description of the Drawings

Sealing, trimming or guiding strips for vehicles and embodying the invention will now be described, by way of example only, with reference to the accompanying diagrammatic drawings in which:

Figure 1 is a side view of a motor vehicle with the rear quarter light encircled;

Figure 2 shows a side view of one of the strips;

Figure 3 shows an enlarged side view of part of the strip of Figure 2 in the region of the rear quarter light of the motor vehicle of Figure 1;

Figure 4 shows a cross-sectional view taken along the line A-A of Figure 3;

Figure 5 shows a cross-sectional view taken along the line B-B of Figure 3;

Figure 6 shows a cross-sectional view of a clip bonded to a pane of glass for co-operation with the structure shown in Figure 5;

Figure 7 shows a cross-section taken along the line C-C of Figure 3;

Figure 8 shows a cross-section taken along the line D-D of Figure 3;

Figure 9 shows a cross-sectional view of an alternative structure to that shown in Figure 5;

Figure 10 shows a cross-sectional view of another alternative structure to the structure shown in Figure 5;

Figure 11 shows a cross-sectional view of a further alternative structure to the structure shown in Figure 5;

Figure 12 shows a view in the region of the rear quarter light of a motor vehicle corresponding to the view shown in Figure 3 but showing the location and orientation

of the enlarged base portion of the clip of the Figure 11 embodiment;

Figure 13 shows a cross-sectional view of yet a further alternative structure to the structure shown in Figure 5;

Figure 14 shows a plan view of a rigid planar member used in the Figure 13 embodiment;

Figure 15 shows a plan view of an alternative rigid member to that shown in Figure 14;

Figure 16 shows a side elevational view of a clip for use with the rigid member of Figure 15; and

Figure 17 shows an alternative arrangement of the strip shown in Figure 4.

In general, in the drawings, like elements are designated with the same reference numeral.

Detailed Description of Embodiments of the Invention

The side elevation of the motor vehicle 1 of Figure 1 shows the vehicle's A-pillar 3 where the front side window 5 (or front quarter light window 6, if provided) runs adjacent to the vehicle windscreen (not shown). The B-pillar 7 lies between the front side window 5 and the main rear side window 9. It is typical for vehicles having rear doors 8 to include, in addition to the main window 9 (which will normally have a glass pane which may be raised and lowered), a smaller quarter light window 11. The quarter light window 11 generally has a fixed glass pane. The vehicle C-pillar 10 runs down the rear side of the frame of the opening for the door 8.

The present invention is primarily concerned with the structure and fabrication of a sealing, trimming or guiding strip for the frame of the rear main window 9 and quarter

light 11, and is particularly concerned with the structure of such a strip in the encircled region 13 of Figure 1.

Figure 2 shows a sealing, trimming or guiding strip for mounting in the frame of main window 9 and quarter light 11. The strip, indicated generally at 15, includes a loop portion extending around the quarter light 11 and a portion extending along the top and sides of the main window 9, having a cross-piece 17 common to both portions. Figure 3 shows in greater detail the strip 15 in the encircled region 13 of Figure 1. The strip 15 has a continuously extruded part 19 that extends continuously along the top of the main window 9 and around the top and rear side of the quarter light 11. The continuously extruded part 19 gives a pleasing external visual appearance with no joins. The construction of the strip 15 in the region 13 will be further understood from the following detailed description of the cross sections A-A, B-B, C-C and D-D.

Figure 4 shows a cross section through the strip 15 at the region above the rear main window 9 (along line A-A of Figure 3). The continuously extruded part 19 forms the outer face of the strip, which is visible from the exterior of the vehicle. The continuously extruded part 19 is formed with regions 21 that are of relatively soft material - as indicated by relatively closely-spaced hatching lines. The inner side of the strip 15 defines a channel 23 which embraces a flange 25 formed by inner and outer panels 35,37 of the rear door 8 and which defines the frame for the window 9 and the quarter light 11. The uppermost exterior surface of the channel 23 carries integral resiliently deformable lips 27 which press against a bodywork panel 29 defining the opening for the rear door 8. The bodywork 29 extends along the top of the door opening, substantially parallel to the roof of the vehicle 1.

A channel-shaped reinforcing carrier 31 is integrally embedded within the continuously extruded part 19 during the extrusion process. The reinforcing carrier 31 may be made of metal and may be slotted or slitted to improve its flexibility. For

example, it may comprise U-shaped elements arranged next to each other to define a channel, the elements being either integrally connected together by short flexible connecting links or perhaps entirely disconnected from each other. Looped wire may be used instead. Other forms of carrier can also be used.

The continuously extruded part 19 is extruded to provide integral resiliently deformable lips 33 within the channel 23 which help to hold the strip securely in position on the flange 25.

The inner and outer panels 35,37 forming the frame of the window are spot-welded (or otherwise attached together) to form the flange 25, then diverge to form a hollow space 38 and come together again to form a further flange 40 where they are again spot-welded (or attached by some other means).

Extended from (and integrally extruded with) the lower side of the channel 23 is a limb 43 which defines a further channel 45 by means of integrally extruded lip 47. The channel 45 accommodates and resiliently embraces the flange 40. The limb 43 is further clamped to the window frame by means of a resiliently deformable protrusion 49 having an enlarged head portion 51 which is pushed through an aperture 39 in the panel 35 and into the hollow space 38. After passing through the aperture 39, the enlarged head portion 51 resiles and presses against the panel 35 around the edges of the aperture 39.

The continuously extruded part 19 of the strip 15 includes an additional lip 41 which engages the panel 35.

The limb 43 carries a lip 53 extending towards a lip 57 formed integrally on the extruded material defining the channel 23. Lips 53 and 57 together form a channel or recess for receiving the edge of the window pane 58 of the window 9. Lip 53 contacts

the inside surface of the window pane 58 when the window is closed. Lip 57 contacts the outer surface of the window pane 58. A further lip 55 engages the top edge of the window pane 58. Each of the lips 53, 55 and 57 may be provided with a coating of flocked material 59 at the point where they engage the glass 9. The lip 53 will not be visible from the exterior of the vehicle. Its upper part will be obscured by the continuously extruded part 19, and may further be obscured by a black shading applied to the upper part of the window pane 58 when the window is closed.

The structure of the strip 15 changes as the strip extends beyond the cross-piece 17 from the main window opening 9 to the quarter light 11. Beyond the cross-piece 17 and extending around the top and rear edge of the quarter light 11, the strip 15 has the form as shown in Figure 5. This form is produced by separating the strip structure shown in Figure 4 along line 61. The material below the line 61 in Figure 4 is removed and may be discarded. A new strip portion 63 (Figure 5) is formed by moulding. The strip portion 63 is attached to the continuously extruded part 19 during the moulding process which forms the strip portion 63. In Figure 5, the structure of the strip to the right of the cut line 61 will not be described further as it is identical to that shown in Figure 4. The strip portion 63 includes a lip 65 similar to the lip 47 shown in Figure 4 which receives and embraces the window frame carried by the vehicle door. An aperture 67 is provided in the strip portion 63. Figure 6 shows the glass pane 68 of the quarter light 11 to which a clip 69 is bonded by means of adhesive 71. The clip 69 passes through the aperture 67 in the strip portion 63 and through a further aperture in the window frame (not shown, but similar to the aperture 39 in Figure 4). The enlarged head portions 73 of the clip 69 deform inwards as they pass through the apertures, whereafter they resile, clamping the glass 11 to the strip part 63 and to the window frame. The quarter light glass 68 is intended to be fixed into position (i.e. it cannot be opened). The co-operation of the clip 69 with the aperture 67 and with the aperture in the window frame makes it difficult to remove the quarter light glass from the door frame, thereby providing a useful security feature.

Where it meets the waist line of the door, the extruded part 19 terminates and the strip 15 has the form 75 shown in Figure 7 (cross-section C-C) along the bottom of the quarter light 11. This strip portion 75 is formed of moulded material, and defines a glass-receiving channel 77. Embedded within the strip portion 75 is a reinforcing carrier 79 having a similar construction to the reinforcing carrier 31 shown in Figure 4. However, the reinforcing carrier optionally includes arcuate portions 80 pressed out from the reinforcing carrier. Lips 81 and 83 are formed at opposite sides of the strip part 75 each side of the quarter light 11. The lips 81 and 83 engage the internal surfaces of a rigid channel (not shown) running along the waist line of the door.

Figure 8 shows the structure of the strip 15 at the cross-piece 17 (Figure 2). Along the cross-piece 17, the seal 15 comprises an extruded part 81 including a channel 83 along which the main rear window 9 slides. The mouth of the channel carries an inwardly directed relatively large lip 85 and an outwardly directed relatively small lip 87 which press against the window 9. The surfaces 89 of the lips 85 and 87 which contact the window 9 may be coated with flocked material. Additionally, the base 91 of the channel 83 may also be coated with flocked material.

Along the cross-piece 17, the strip 15 further comprises a channel-shaped moulded part 93 which accommodates the front edge of the quarter light glass 68. The quarter light glass 68 may be fixed with respect to the moulded part 93 by means of adhesive.

The extruded part 81 and the moulded part 93 are accommodated in a rigid division bar 95 of substantially H-shape. The central limb 97 of division bar 95 extends between the extruded part 81 and the moulded part 93. The side pieces 99 of the division bar 95 are accommodated in recesses 101 formed in adjacent portions of the extruded part 81 and the moulded part 93. The division bar 95 is formed by a thin sheet of metal (or other stiff material). In Figure 8, side pieces 99 are formed by a

sheet of material folded over itself to form a double layered structure, with the material then extending to form the central limb 97, such that the division bar 95 is formed from a single sheet of material.

During assembly, the quarter light pane 68 is accommodated in the moulded part 93 before the moulded part 93 and the extruded part 81 are fitted into the division bar 95.

This sequence enables the sides of the channel of the part 93 to be opened up to receive the pane 68. The division bar 95 is visible from the interior and exterior of the motor vehicle 1, and is typically coloured black to match the colour of the strip 15.

The division bar 95 is mounted at its lower end into the rigid channel (not shown) running along the waist line of the door. At its upper end the division bar 95 passes through a hole in the window frame and is secured by a screw and clip (none of which is shown).

During manufacture and after cutting the continuously extruded part 19 at the line 61 (Figure 4) and discarding the lower part of the limb 43, the remaining extruded material 19 is placed in a mould which then moulds onto the extruded material the moulded part 63 shown in Figure 5, the moulded part 75 shown in Figure 7 and the moulded part 93 as shown in Figure 8, the respective extruded and moulded parts being formed as an integral element. Alternatively, the parts 63, 75 and 93 could be formed by separate moulding steps or operations.

Figure 9 shows an alternative configuration for the moulded part 63 of Figure 5. The alternative part 103 includes integrally moulded clips 105 which pass through an aperture in the window frame and clamp the part 103 to the window frame.

Figure 10 shows another alternative arrangement, where a moulded part 107 has a clip 109 formed of relatively rigid material embedded within the part 107 during moulding

of the part 107. The clip 109 passes through an aperture in the door frame to secure the part 107 thereto. The clip 109 comprises resiliently deformable head portions 112 which clamp the part 107 to the window frame panel 35. The opposite end of the clip 109 comprises a generally planar, substantially circular base portion 114.

Figure 11 shows a further alternative arrangement corresponding closely to the arrangement of Figure 10. However, in the Figure 11 arrangement the base 114' of the clip 109' is generally planar and substantially trapezium-shaped, as shown by the dashed lines of Figure 12. The base portion 114' extends outwardly from the moulded part 107 so that it overlies the upper part of the limb 43 of the extruded part 19. The distance "X" between the distal end of the base portion 114' and the outer surface of the reinforcing carrier 31 is reduced by the Figure 11 modification, and this increases the amount of force required to detach the seal assembly, comprising the part 107, from the panel 35 (referred to as the "pull-off" force). Advantageously, the pull-off force required may be greater than or equal to 700N. The pull-off force is increased because the extended base portion 114' increases the rigidity of the moulded part 107.

Yet another arrangement of the moulded part (in this embodiment designated 200) is shown in Figure 13.

The general shape of the moulded part 200 is the same as the moulded parts 63, 103 and 107 of the embodiments described above. However, a generally planar, substantially trapezium-shaped member 202 is embedded within the moulded part 200.

The member 202 is relatively rigid. The member 202 is shown in more detail in Figure 14. The member 202 comprises a relatively large central circular hole 204 formed therein, which is surrounded by seven smaller circular holes 206. The small holes 206 allow the material of the moulded part 200 to pass therethrough to provide improved securing and location of the member 202. The larger hole 204 is positioned to be aligned with a hole 208 formed through the moulded part 200 from the upper

surface, adjacent to the window pane 68, to the lower surface, adjacent to the door panel 35. The wider end 209 of the member 202 is positioned to extend from the moulded part 200 and overlies the limb 45 of the extruded part 19, in a similar manner to the Figure 11 embodiment. The orientation of the member 202 corresponds to the orientation of the base part 114' shown in Figures 11 and 12. The distance "X" between the distal end of the member 202 and the outwardly facing surface of the reinforcing carrier 31 is minimised to provide a high pull-off force, as in the Figure 11 embodiment.

A clip 210 having a cylindrical main body portion 212 sized to be accommodated within the aperture 208 is pushed through the aperture 208 in order to secure the moulded part 200 to the panel 35. Resiliently deformable enlarged head portions 214 clamp the clip 210 to the panel 35 after being pushed through the aperture 39 therein, in cooperation with the enlarged base portion 216 at the opposite end of the clip 210. Lips 218, 220 are formed at the upper and lower surfaces of the moulded part 200 at opposite ends of the aperture 208 which are relatively easily compressible in order to allow for variations in manufacturing tolerances of the door panel 35 and the seal assembly.

In a variation to the Figure 13 and 14 embodiment, a rigid annular insert (not shown) is provided in the aperture 208, such that it acts as a rigid liner, to secure the moulded part 200 more firmly to the panel 35. The annular rigid insert may extend from and be integrally formed with the rigid member 202, or may be separate therefrom.

Figures 15 and 16 show respectively, in detail, a rigid member 202 and a clip 210 that may be employed in the Figure 13 and 14 embodiment. The relatively large circular hole 204 in the clip 210 may be provided with two generally rectangular recesses 220 provided at opposite sides of the hole 204. The opposite converging sides of the clip 210 may be provided with chamfered edges 222.

A clip 210 for use with the member 202 is shown in Figure 16. The clip includes protrusions 224 correspondingly sized and positioned for passing through the recesses 220, whereafter relative rotation between the clip 210 and the member 202 prevents relative longitudinal movement between the clip 210 and the member 202. This is in addition to the clamping provided by the head portions 214, which have a different configuration in Figure 16 from that shown in Figure 13, there being no hollow space provided between the head portions 214 in Figure 16.

If one of the arrangements of Figures 9 to 16 is employed, the quarter light glass 68 may advantageously be bonded to the surface 111 of the part 103, 107 or 200.

Figure 17 shows a modification to the strip 15 shown in Figure 4. The structure of the strip 15 in Figure 17 is the same as that of the strip shown in Figure 4, with the exception that an additional metal carrier 300 is incorporated in the limb 43, which limb 43 is extruded from (and integrally extruded with) the lower side of the channel 23. The additional metal carrier 300 may, of course comprise materials other than metal. Any suitable rigid material could be employed.

The additional carrier 300 is a planar elongate member which extends into and out of the page of the Figure as shown. The additional carrier 300 is positioned in the region generally above the resiliently deformable protrusion 49, although positioning of the additional carrier 300 at this point is not essential.

The additional carrier 300 increases the longitudinal rigidity of the limb 43.

The additional carrier 300 is integrally embedded within the limb 43 during the extrusion process forming the limb 43 (and other components of the strip 15). The

strip 15 will emerge from the extruder as it is formed. The presence of the additional carrier 300, by increasing the longitudinal rigidity, will eliminate or reduce the tendency for the strip 15, and in particular the limb 43, to sag or bend downwards as it emerges from the extruder. This makes it easier to handle the strip 15. For example, it is easy for the strip 15 to be accurately cut to the required size.

The sealing, trimming or guiding strip of the invention is also applicable to the front side window of a vehicle.